

FIG. 1

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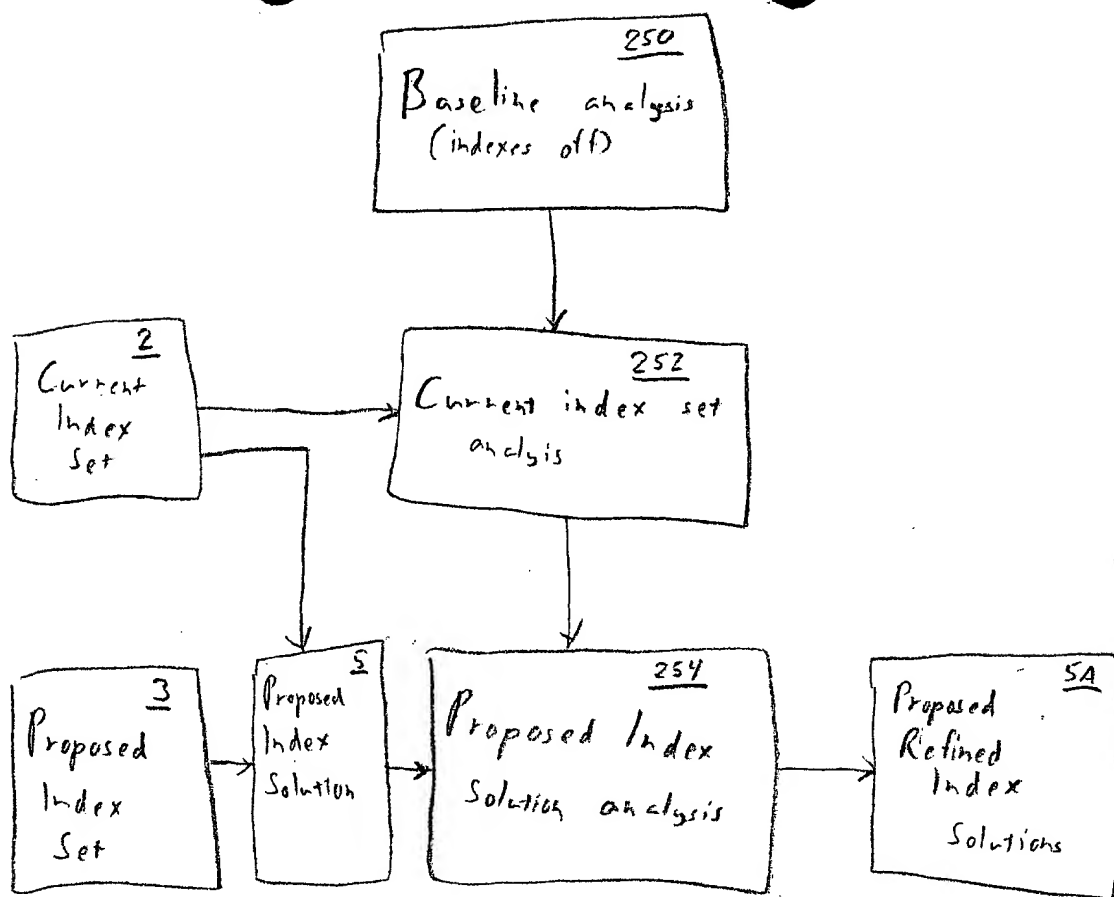


Fig. 2

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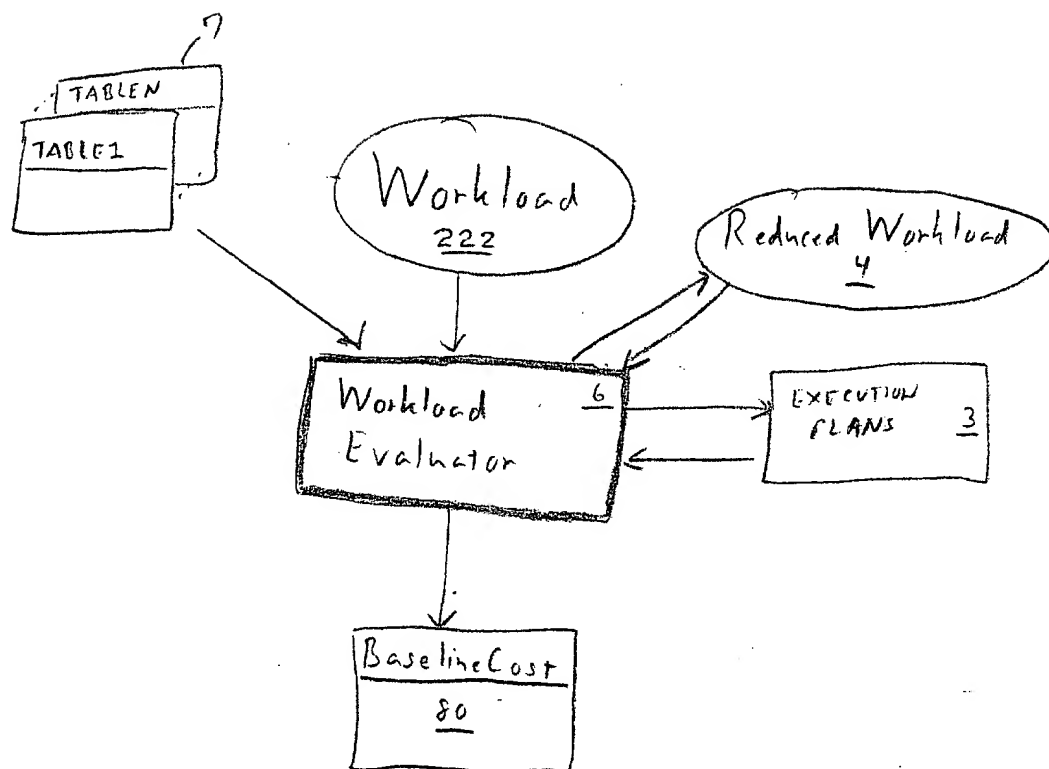


Fig. 3A

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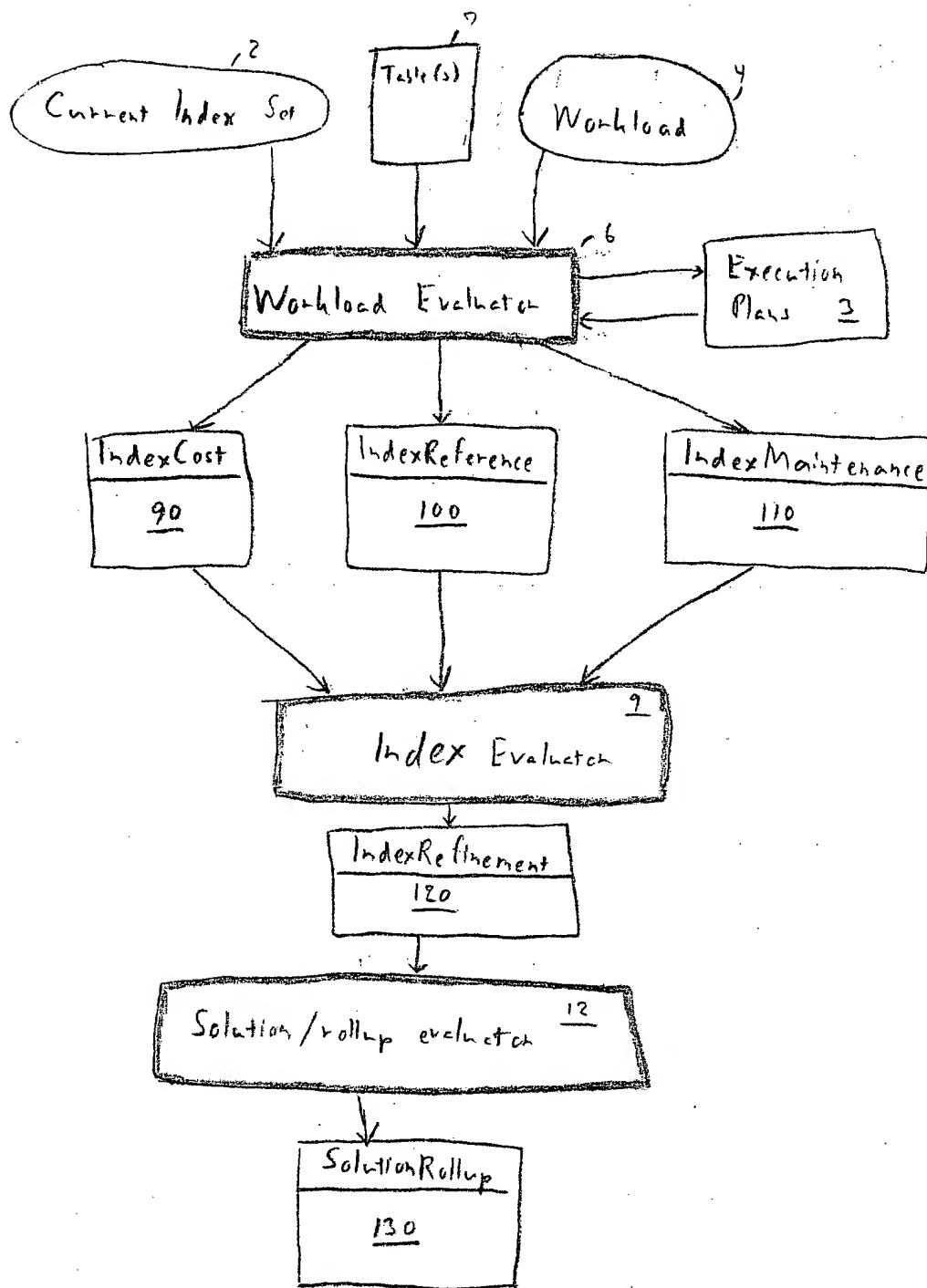


Fig. 3B

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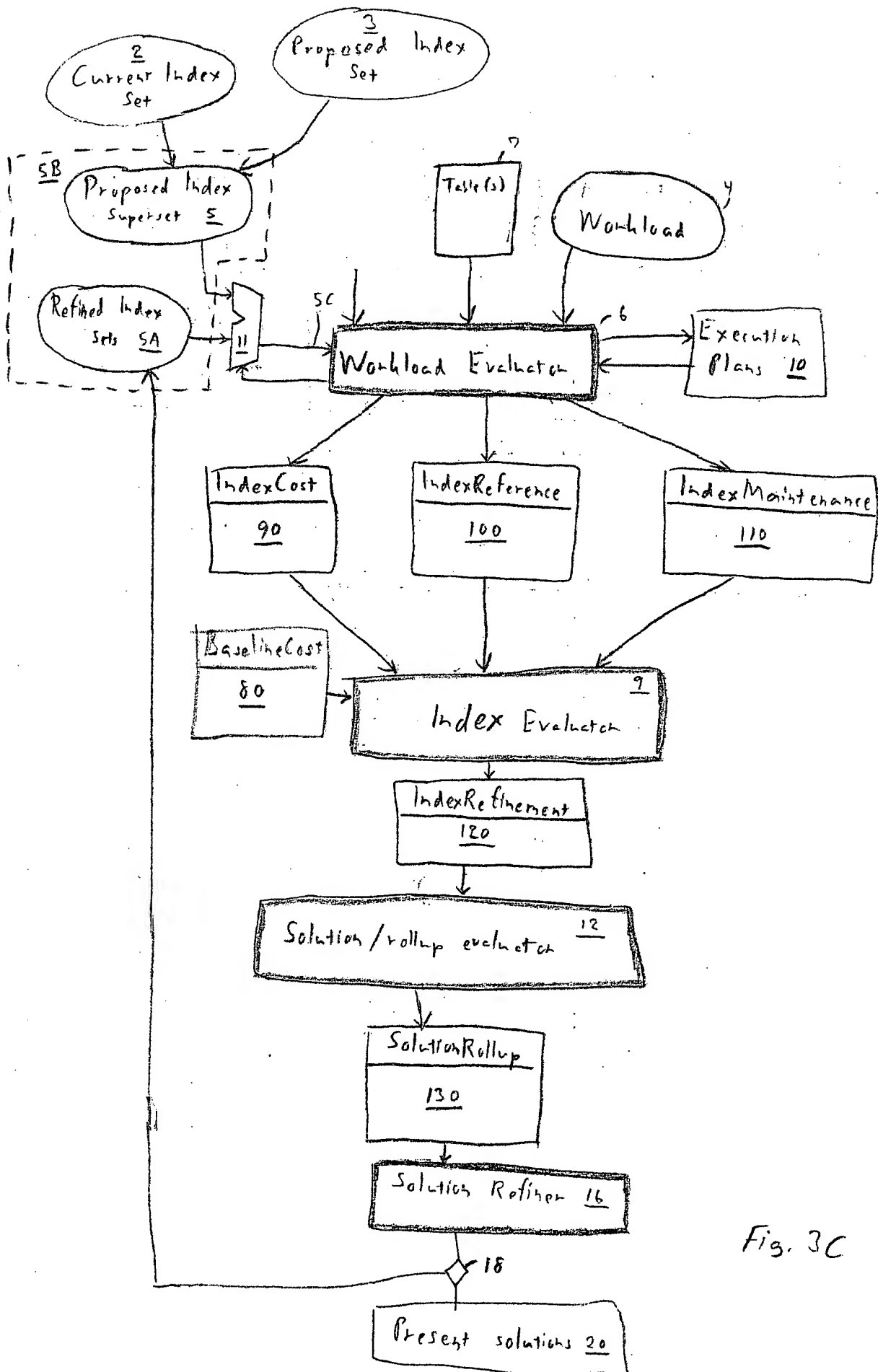


Fig. 3C

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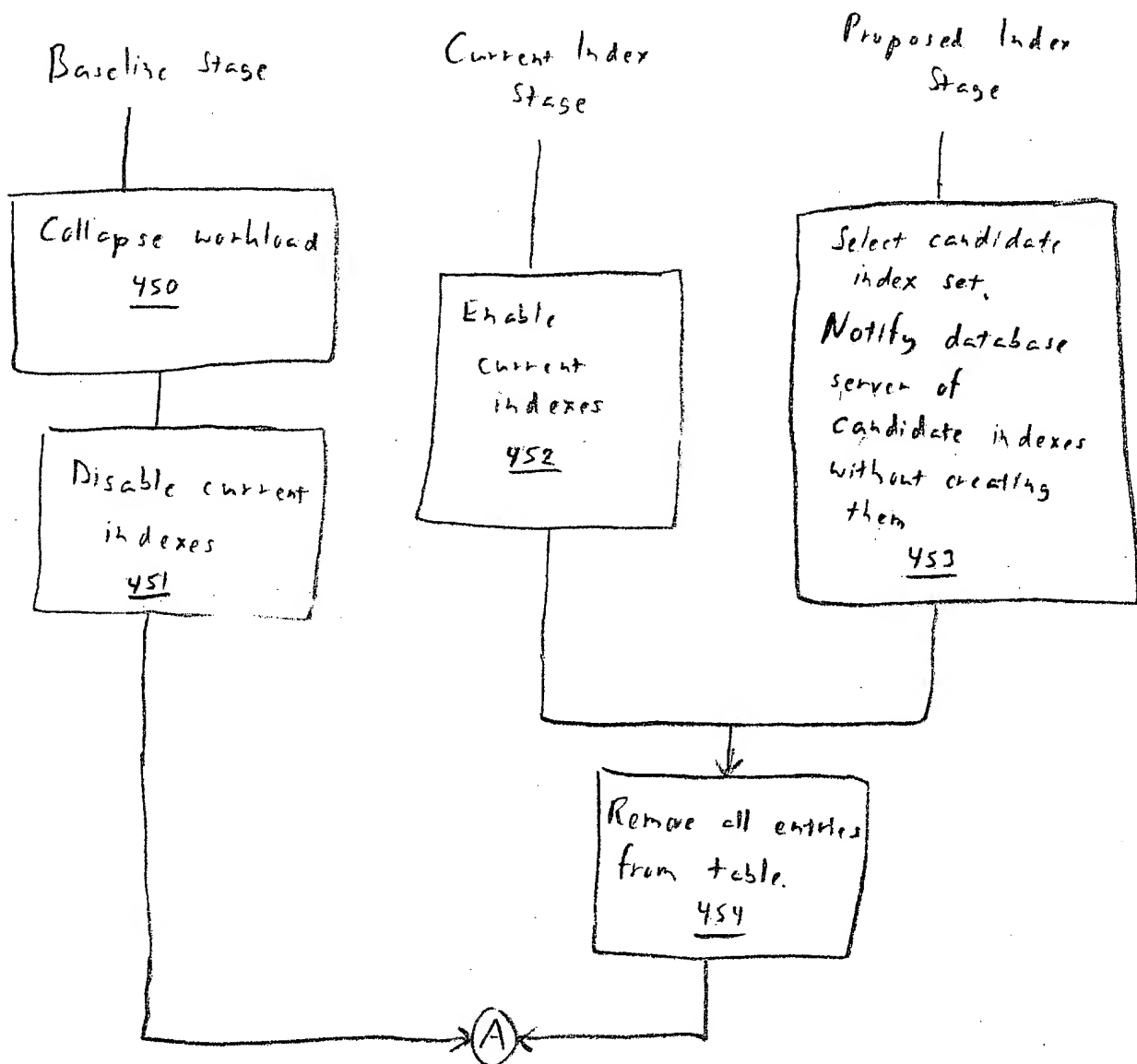


Fig. 4A

```

graph TD
    A((A)) --> D456{456  
More SQL  
statements?}
    D456 -- Yes --> P458[458  
Select a statement.]
    D456 -- No --> J1(( ))
    J1 -- Other --> B((B))
    J1 -- Baseline --> D459(459  
Done)
    P458 --> P460[/460  
Create execution plan/]
    P460 -.-> E462[462  
Evaluate execution plan  
Determine cost]
    E462 -.-> J2(( ))
    J2 -- Baseline stage --> R464A[Record: 464A  
1) Cost of execution plan  
2) # of executions  
3) User-defined weight]
    J2 -- Current or Proposed Index stage --> R464B[Record: 464B  
Cost of execution plan]
    R464A -.-> BC[Baseline Cost  
80]
    R464B -.-> IC[Index Cost  
90]
    R464B --> D466{466  
Data access  
using index?}
    D466 -- No --> J3(( ))
    D466 -- Yes --> R468[Record: 468  
1) indexes used  
2) # of times used]
    R468 -.-> IR[Index Reference  
100]
    J3 --> D456
    R468 --> D456
  
```

Fig. 4B

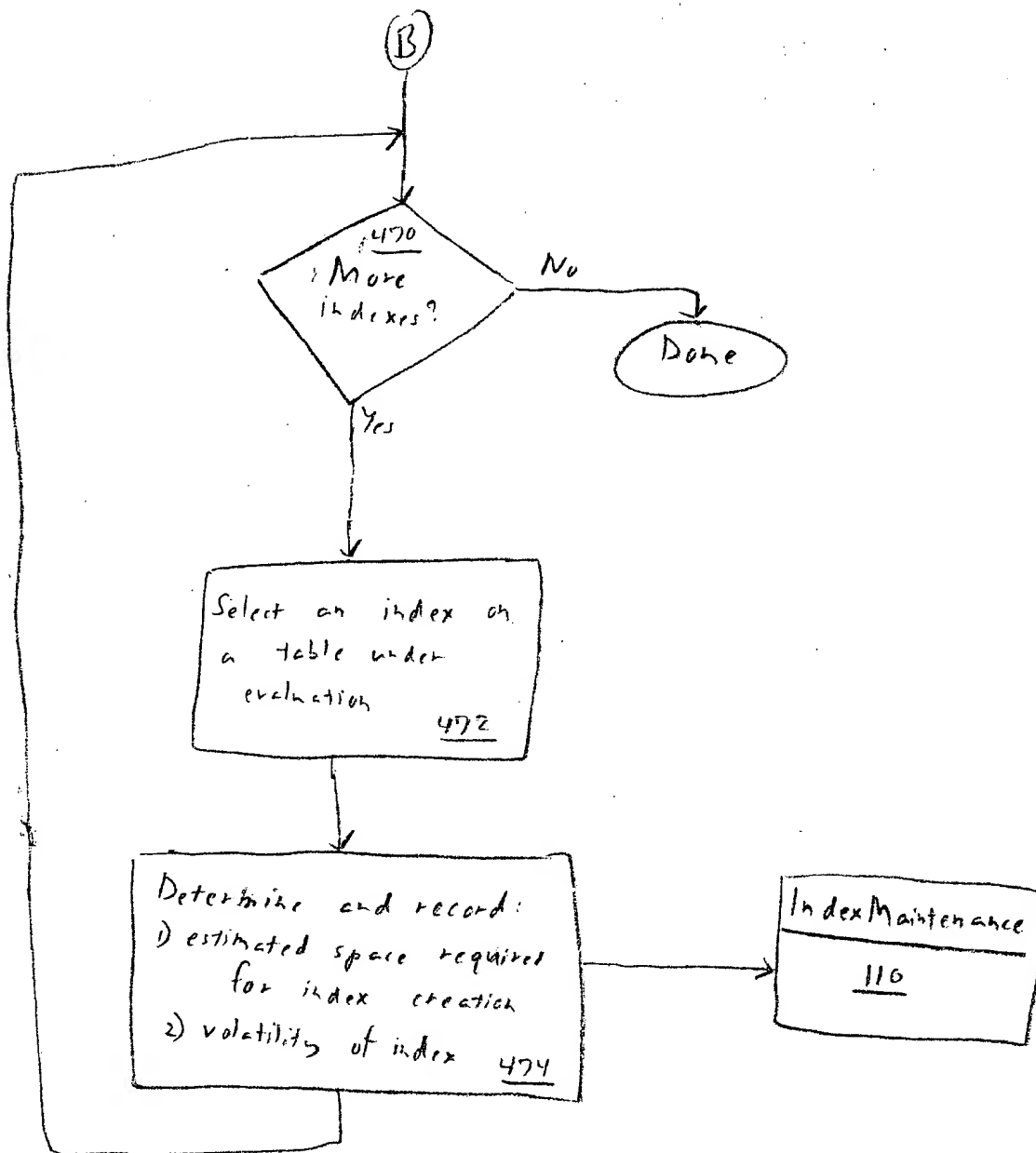
[illegible]

Fig. 4C

BaselineCost Table

<u>StmtId</u> 82	<u>Cost</u> 84	<u>Executions</u> 86	<u>Weight</u> 88	<u>UsageCost</u> 89

Fig. 5

IndexCost Table

<u>StmtId</u> 92	<u>Cost</u> 94	<u>UsageCost</u> 96

Fig. 6

IndexReference Table

<u>StmtId</u> 102	<u>IndexName</u> 104	<u>IndexRefCount</u> 106

Fig. 7

IndexMaintenance Table

<u>IndexName</u> 112	<u>RequiredSpace</u> 114	<u>Volatility</u> 116

Fig. 8

IndexRefinement Table

<u>IndexName</u> 122	<u>UsageValue</u> 124

Fig. 10

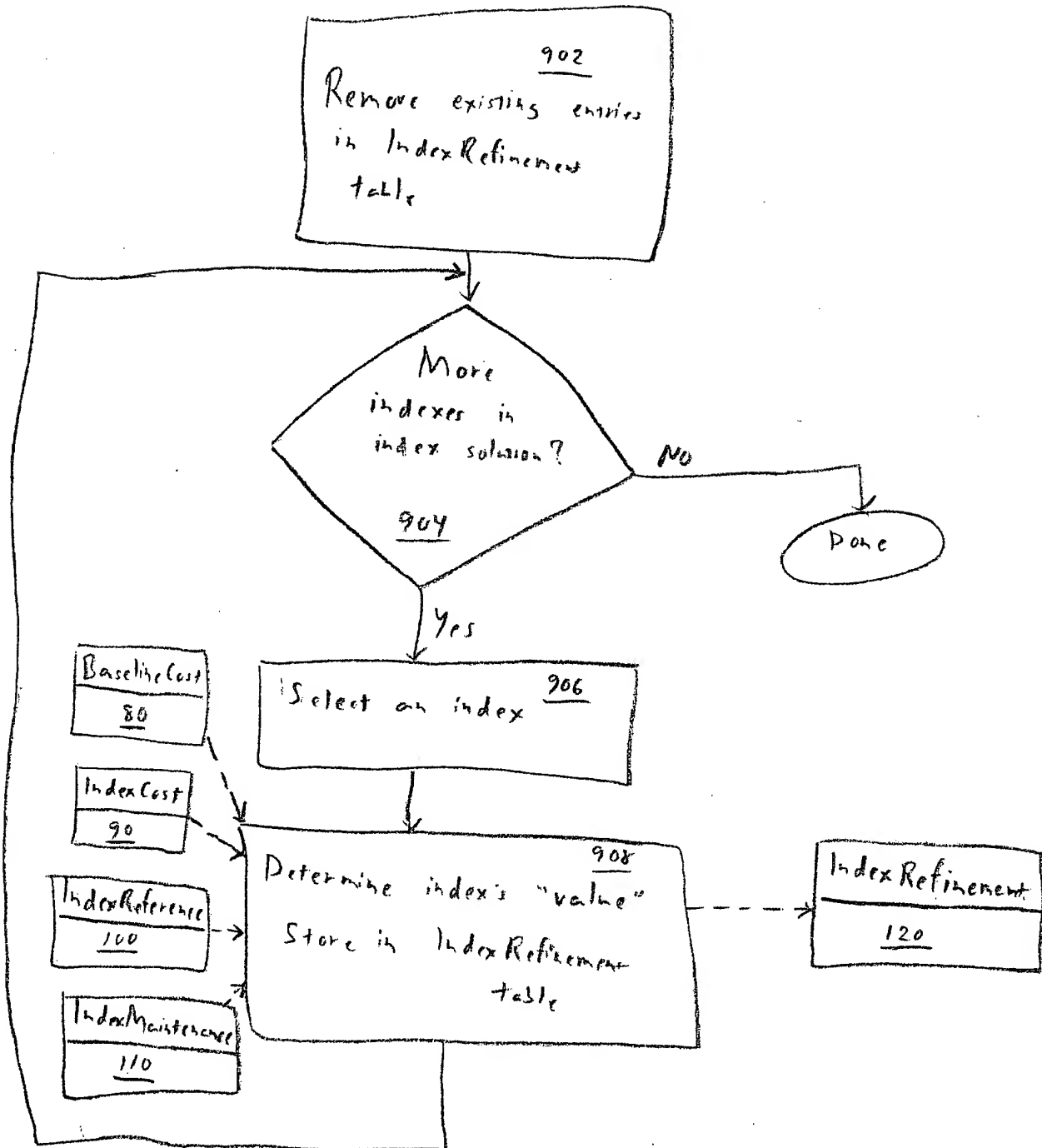


Fig. 9.

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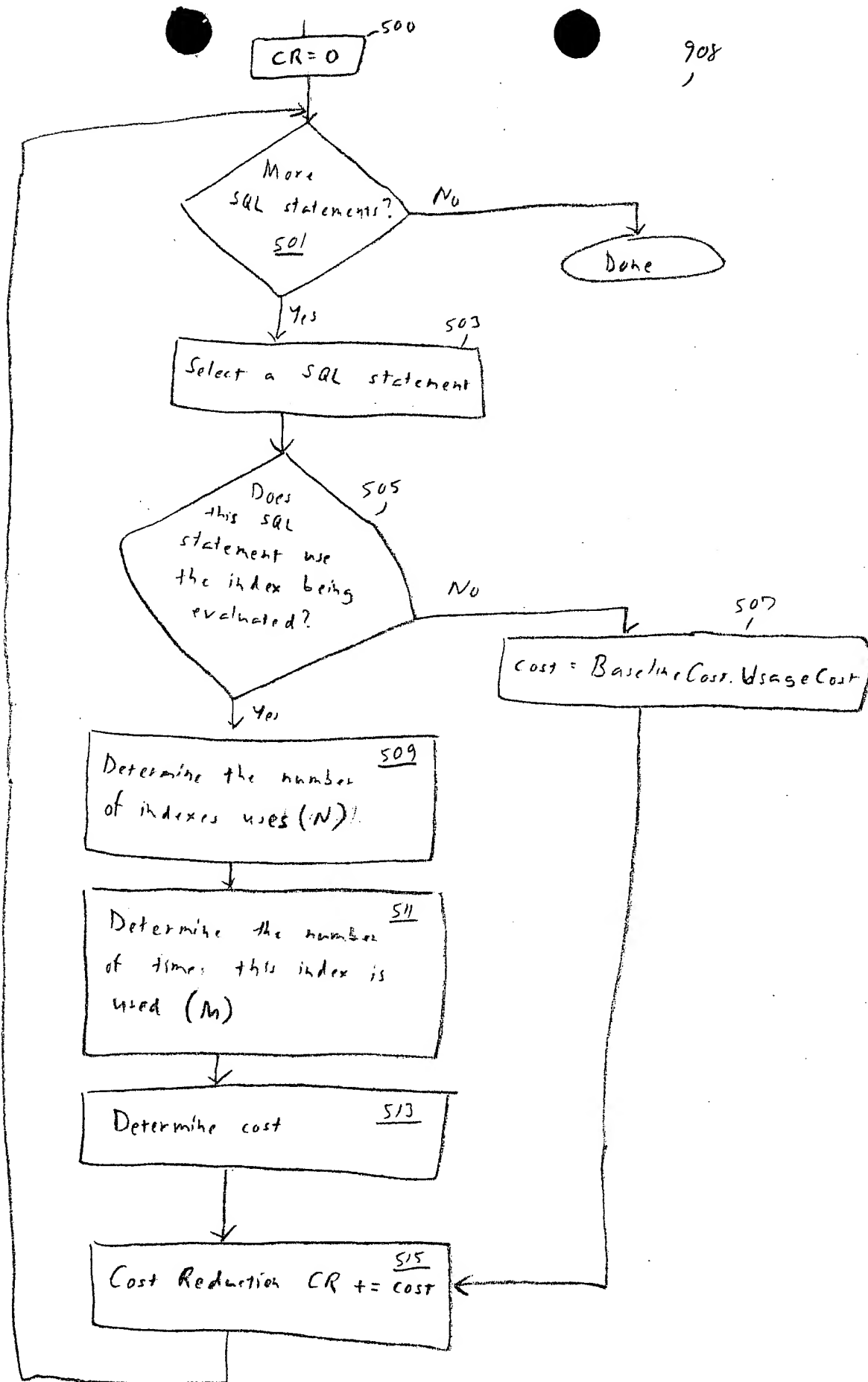


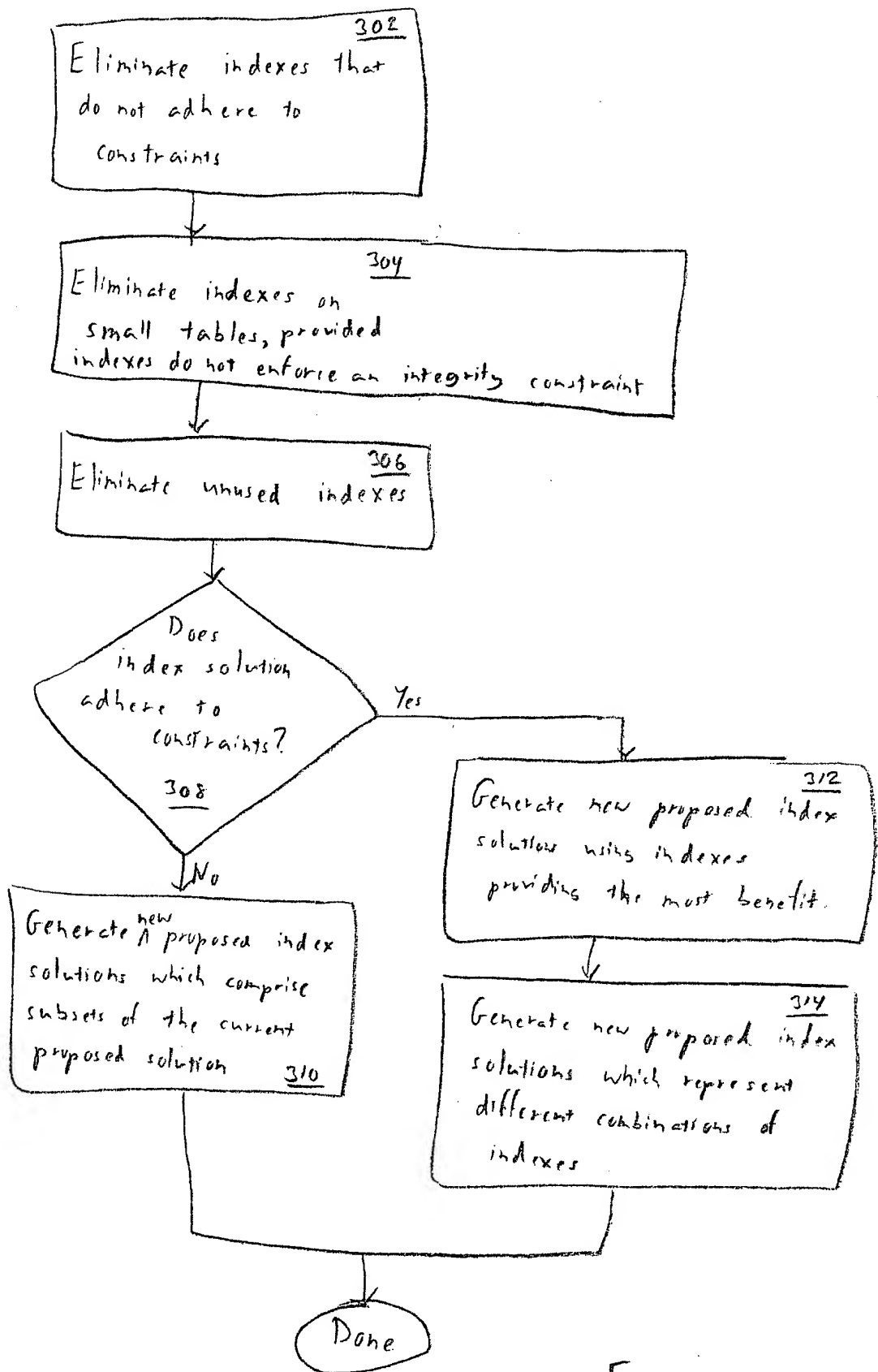
Fig. 11

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,

SolutionRollupTable				
<u>SolutionId 132</u>	<u>Cost 134</u>	<u>SpaceRequired 136</u>	<u>Volatility 138</u>	<u>Efficiency 139</u>

Fig. 12



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Fig. 13

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TABLE1 600

COL 1	COL 2	COL 3	COL 4	COL 5
<u>601</u>	<u>602</u>	<u>603</u>	<u>604</u>	<u>605</u>

TABLE2 610

COL 1	COL 2
<u>611</u>	<u>612</u>

TABLE3 620

COL 1	COL 2	COL 3
<u>621</u>	<u>622</u>	<u>623</u>

The diagram shows two boxes below Table 3. The first box is labeled **IDX3_1** and 625. The second box is labeled **IDX3_2** and 626. An arrow points from the first box to the first column of Table 3 (containing 621). Another arrow points from the second box to the second column of Table 3 (containing 622). A third arrow points from the second box to the third column of Table 3 (containing 623).

TABLE4 630

COL 1	COL 2
<u>631</u>	<u>632</u>

Fig. 14

```

/*S1*/ select COL_4 from TABLE1 where COL_2 = 1;

/*S2*/ select COL_2, COL_1 from TABLE 1 where COL_2 in (1,5,10);

/*S3*/ select COL_1 from TABLE1 where COL_2 = 1 and COL_3 = 2
union all
select COL_1 from TABLE1 where COL_2 = 3 and COL_3 = 4
union all
select COL_1 from TABLE1 where COL_2 = 5;

/*S4*/ select COL_1 from TABLE1 where COL_2 = (select COL_2 from TABLE2
where COL_1 = 10);

/*S5*/ insert into TABLE1 values (1, 2, 3, 4, 5);

/*S6*/ update TABLE2 set COL_1 = 10 where COL_1 = 20;

/*S7*/ select COL_3 from TABLE3 where COL_1 = 1;

/*S8*/ update TABLE3 set COL_3 = "Oracle Corp" where COL_1 < 30;

```

Fig. 15

661	{	S1 (Cost 260) SELECT STATEMENT TABLE ACCESS (FULL) OF TABLE1
662	{	S2 (Cost 260) SELECT STATEMENT TABLE ACCESS (FULL) OF TABLE1
663	{	S3 (Cost 780) SELECT STATEMENT UNION-ALL TABLE ACCESS (FULL) OF TABLE1 TABLE ACCESS (FULL) OF TABLE1 TABLE ACCESS (FULL) OF TABLE1
664	{	S4 (Cost 260) SELECT STATEMENT FILTER TABLE ACCESS (FULL) OF TABLE1 TABLE ACCESS (FULL) OF TABLE2
665	{	S5 (Cost 260) INSERT STATEMENT INTO TABLE1
666	{	S6 (Cost 101) UPDATE STATEMENT UPDATE OF TABLE2 TABLE ACCESS (FULL) OF TABLE2
667	{	S7 (Cost 147) SELECT STATEMENT TABLE ACCESS (FULL) OF TABLE3
668	{	S8 (Cost 147) UPDATE STATEMENT UPDATE OF TABLE3 TABLE ACCESS (FULL) OF TABLE3

Fig. 16

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BaselineCost Table 80

<u>StmtId</u> 82	<u>Cost</u> 84	<u>Executions</u> 86	<u>Weight</u> 88	<u>UsageCost</u> 89
S1	260	50	1.0	13000
S2	260	10	0.5	1300
S3	780	500	0.5	195000
S4	260	100	0.5	13000
S5	260	10	0.25	650
S6	101	40	0.25	1010
S7	147	500	1.0	73500
S8	147	50	1.0	7350

Fig. 17

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WORKLOAD EVALUATION 660A

661A	{	S1 (Cost 26) SELECT STATEMENT TABLE ACCESS (FULL) OF TABLE1
662A	{	S2 (Cost 260) SELECT STATEMENT TABLE ACCESS (FULL) OF TABLE1
663A	{	S3 (Cost 780) SELECT STATEMENT UNION-ALL TABLE ACCESS (FULL) OF TABLE1 TABLE ACCESS (FULL) OF TABLE1 TABLE ACCESS (FULL) OF TABLE1
664A	{	S4 (Cost 260) SELECT STATEMENT FILTER TABLE ACCESS (FULL) OF TABLE1 TABLE ACCESS (FULL) OF TABLE2
665A	{	S5 (Cost 260) INSERT STATEMENT INTO TABLE1
666A	{	S6 (Cost 101) UPDATE STATEMENT UPDATE OF TABLE2 TABLE ACCESS (FULL) OF TABLE2
667A	{	S7 (Cost 3) SELECT STATEMENT INDEX (RANGE SCAN) ACCESS (FULL) OF IDX3_2
668A	{	S8 (Cost 3) UPDATE STATEMENT UPDATE OF TABLE3 INDEX (RANGE SCAN) ACCESS (FULL) OF IDX3 2

Fig. 18

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IndexCost Table 90

<u>StmtId</u> 92	<u>Cost</u> 94	<u>UsageCost</u> 96
S1	260	13000
S2	260	1300
S3	780	195000
S4	260	13000
S5	260	650
S6	101	1010
S7	3	1500
S8	3	150

Fig. 19

IndexReference Table 100

<u>StmtId</u> 102	<u>IndexName</u> 104	<u>IndexRefCount</u> 106
S7	IDX3_2	1
S8	IDX3_2	1

Fig. 20

IndexMaintenance Table 110

<u>Index Name</u> 112	<u>Required Space</u> 114	<u>Volatility</u> 116
IDX3_1	5760	0
IDX3_2	8320	3.97

Fig. 21

<u>IndexName</u>	<u>122</u>	<u>UsageValue</u>	<u>124</u>
IDX3_1		0	
IDX3_2		22.03	

[illegible]

SolutionId <u>132</u>	Cost <u>134</u>	RequiredSpace <u>136</u>	Volatility <u>138</u>	Efficiency <u>139</u>
current	225610	14080	3.97	22.03

Fig. 23

WORKLOAD EVALUATION 660B

661B	{	S1 (Cost 4) SELECT STATEMENT TABLE ACCESS (BY INDEX ROWID) OF TABLE1 INDEX (RANGE SCAN) OF IDX1_1 (NON-UNIQUE)
662B	{	S2 (Cost 3) SELECT STATEMENT INLIST ITERATOR INDEX (RANGE SCAN) OF IDX1_2 (NON-UNIQUE)
663B	{	S3 (Cost 9) SELECT STATEMENT UNION-ALL INDEX (RANGE SCAN) OF IDX1_2 (NON-UNIQUE) INDEX (RANGE SCAN) OF IDX1_2 (NON-UNIQUE) INDEX (RANGE SCAN) OF IDX1_2 (NON-UNIQUE)
664B	{	S4 (Cost 3) SELECT STATEMENT INDEX (RANGE SCAN) OF IDX1_2 (NON-UNIQUE) TABLE ACCESS (BY INDEX ROWID) OF TABLE2 INDEX (RANGE SCAN) OF IDX2_1 (NON-UNIQUE)
665B	{	S5 (Cost 260) INSERT STATEMENT INTO TABLE1
666B	{	S6 (Cost 3) UPDATE STATEMENT UPDATE OF TABLE2 INDEX (RANGE SCAN) OF IDX2_1 (NON-UNIQUE)
667B	{	S7 (Cost 3) SELECT STATEMENT INDEX (RANGE SCAN) ACCESS (FULL) OF IDX3_2
668B	{	S8 (Cost 3) UPDATE STATEMENT UPDATE OF TABLE3 INDEX (RANGE SCAN) ACCESS (FULL) OF IDX3_2

Fig. 24

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IndexCost Table 90

StmtId <u>92</u>	Cost <u>94</u>	UsageCost <u>96</u>
S1	4	200
S2	3	15
S3	9	2250
S4	3	150
S5	260	650
S6	3	30
S7	3	1500
S8	3	150

Fig. 25

IndexReference Table 100

StmtId <u>102</u>	IndexName <u>104</u>	IndexRefCount <u>106</u>
S1	IDX1_1	1
S2	IDX1_2	1
S3	IDX1_2	3
S4	IDX1_1	1
S4	IDX1_2	1
S6	IDX2_1	1
S7	IDX3_2	1
S8	IDX3_2	1

Fig. 26

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